



**[4910-13]**

## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 25**

**[Docket No. FAA-2014-0244; Special Conditions No. 25-552-SC]**

**Special Conditions: Boeing Model 787-9, side-facing seats.**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special condition; request for comments.

**SUMMARY:** These special conditions are issued for the Boeing Model 787-9 airplane. This airplane has a novel or unusual design feature associated with side-facing seats. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for occupants of seats installed at an angle of 49 degrees to the centerline of the airplane, nor for inflatable restraint systems. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** The effective date of these special conditions is **[insert date of FR publication]**. We must receive your comments by **[insert date 45 days after FR publication]**.

**ADDRESSES:** Send comments identified by docket number FAA-2014-0244 using any of the following methods:

Federal eRegulations Portal: Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.

Mail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, D.C., 20590-0001.

Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Jeff Gardlin, Airframe and Cabin Safety, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW, Renton, Washington 98057-3356; telephone 425-227-2136; facsimile 425-227-1149.

## **SUPPLEMENTARY INFORMATION:**

The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions are impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected airplane. In addition, the substance of these special conditions has been subject to the public-comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon publication in the *Federal Register*.

### **Comments Invited**

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

### **Background**

On May 28, 2009, The Boeing Company applied for an amendment to type certificate no. T00021SE to include the new Model 787-9 airplane. The Model 787-9, which is a derivative of the Model 787 airplane currently approved under type certificate no. T00021SE, is a wide-body twin jet with wing-mounted engines. It has a 420-passenger capacity, a maximum takeoff weight of 553,000 lb/251,360 kg, and is equipped with two Rolls-Royce Trent T1000 or General Electric GENx engines.

Amendment 25-15 to part 25, dated October 24, 1967, introduced the subject of side-facing seats and a requirement that each occupant in a side-facing seat must be protected from

head injury by a safety belt and a cushioned rest that will support the arms, shoulders, head, and spine.

Subsequently, Amendment 25-20, dated April 23, 1969, clarified the definition of sideward-facing seats to require that each occupant of a seat that is positioned at more than an 18 degree angle to the vertical plane containing the airplane centerline must be protected from head injury by a safety belt and an energy-absorbing rest that supports the arms, shoulders, head, and spine; or by a safety belt and shoulder harness that prevents the head from contacting injurious objects. The FAA concluded that a maximum 18-degree angle would provide an adequate level of safety based on tests that were performed at that time, and thus adopted that standard.

Part 25 was amended June 16, 1988, by Amendment 25-64, to revise the emergency-landing conditions that must be considered in the design of the airplane. Amendment 25-64 revised the static-load conditions in § 25.561, and added a new § 25.562 that required dynamic testing for all seats approved for occupancy during takeoff and landing. The intent of Amendment 25-64 is to provide an improved level of safety for occupants on transport-category airplanes. Because most seating is forward-facing on transport-category airplanes, the pass/fail criteria developed in Amendment 25-64 focused primarily on these seats. As a result, the FAA issued Policy Memorandums ANM-03-115-30 and PS-ANM-100-2000-00123 to provide the additional guidance necessary to demonstrate the level of safety required by the regulations for side-facing seats.

To reflect current research findings, the FAA developed a methodology to address all fully side-facing seats (i.e, seats oriented in the airplane with the occupant facing 90 degrees to the direction of airplane travel) and has documented those requirements in a set of proposed new

special conditions. In this regard, the FAA has issued Policy Statement PS-ANM-25-03-R1 which effectively conveys revised injury criteria associated with neck and leg injuries.

The Model 787-9 Air New Zealand Business Class seat installation is novel such that the current Model 787-8 side-facing seat special conditions do not adequately convey occupant protection expectations for an intermediate 49-degree, side-facing seat installation. Therefore, the configuration Boeing proposes requires revised special conditions.

### **Type Certification Basis**

Under the provisions of 14 CFR 21.101, Boeing must show that the 787-9 meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-128, except for earlier amendments as agreed upon by the FAA. These regulations will be incorporated into type certificate no. T00021SE after type certification approval of the 787-9. The regulations incorporated by reference in T00021SE are as follows:

The type-certification basis for the Model 787-9 airplane is 14 CFR part 25, effective February 1, 1965, as amended by Amendments 25-1 through 25-128, except § 25.795, Security Considerations, at Amendment 25-016; and § 25.125, Landing, at Amendment 25-108.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Boeing Model 787-9 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the

same type certificate be modified to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model.

In addition to the applicable airworthiness regulations and special conditions, the Boeing Model 787-9 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.101.

### **Novel or Unusual Design Features**

The Boeing Model 787-9 airplane will incorporate the following novel or unusual design features:

Installation of Model UCS3 oblique business-class passenger seats manufactured by Zodiac Seats UK, which are seats installed at an angle of 49 degrees to the airplane centerline. In addition, the seat divider wall includes an inflatable restraint system for occupant restraint and injury protection. To provide a level of safety equivalent to that afforded to occupants of forward- and aft-facing seats, additional airworthiness standards, in the form of special conditions, are necessary. Although special conditions 25-431-SC and 25-458-SC already apply to the 787, these do not directly address the complex occupant-loading conditions introduced by a seat the centerline of which is at a 49-degree angle to the centerline of the airplane.

### **Discussion**

The business class seating configuration proposed by Boeing is unique due to the seat installation at a 49-degree angle to the airplane centerline. Special conditions 25-458-SC were not intended to address this configuration nor is this configuration specifically addressed by policy statement PS-ANM-25-03-R1 (which is intended to address fully side-facing seats i.e., 90

degree installation angle). However, we believe the occupant-injury criteria conveyed in this policy statement is germane to this type of configuration when it comes to evaluating neck and leg injuries. Due to the unique seat installation angle, the revised special conditions also include spinal-loading injury criteria.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

### **Applicability**

As discussed above, these special conditions are applicable to the Boeing Model 787-9 airplane. Should Boeing apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

### **Conclusion**

This action affects only certain novel or unusual design features on one model of airplanes. It is not a rule of general applicability.

Under standard practice, the effective date of final special conditions would be 30 days after the date of publication in the Federal Register; however, as the certification date for the Boeing Model 787-9 airplane is imminent, the FAA finds that good cause exists to make these special conditions effective upon publication in the *Federal Register*.

### **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type-certification basis for Boeing Model 787-9 airplanes modified by Boeing.

### ***Side-Facing Seats Conditions***

#### **Proposed Injury Criteria**

1. **Existing Criteria:** All injury-protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupant of a side-facing seat. Head-injury criterion (HIC) assessments are only required for head contact with the seat and/or adjacent structures.
2. **Body-to-Wall/Furnishing Contact:** Under the load condition defined in § 25.562(b)(2), the seat must be installed aft of a structure such as an interior wall or furnishing that will support the pelvis, upper arm, chest, and head of an occupant seated next to the structure. A conservative representation of the structure and its stiffness must be included in the tests.
3. **Thoracic Trauma:** Under the load condition defined in § 25.562(b)(2), thoracic-trauma index (TTI) injury criterion must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. Testing must be conducted with a side-impact dummy (SID), as defined by Title 49, Code of Federal Regulations (CFR) part 572, subpart F, or its equivalent. TTI must be less than 85, as defined in 49 CFR part 572, subpart F. The SID TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) part 571.214, section S6.13.5.
4. **Pelvis:** Under the load condition defined in § 25.562(b)(2), pelvic lateral acceleration must be shown, by dynamic test or by rational analysis based on previous test(s) of a



similar seat installation, to not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS part 571.214, section S6.13.5.

5. **Shoulder Strap Loads:** Where upper torso straps (shoulder straps) are used for occupants, tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.
6. **Neck Injury Criteria:** The seating system must protect the occupant from experiencing serious neck injury. In this regard, neck injury must be evaluated to the criteria provided in Policy Statement PS-ANM-25-03-R1, Attachment 1, Section 2.f.
7. **Leg Injury Criteria:** Axial rotation of the upper leg must be limited to 35 degrees in either direction from the nominal seated position.
8. **Spine:** The shoulders must remain aligned with the hips throughout the impact sequence, or until the spinal loads (in either tension or compression) drop below the value that would be injurious.

### **General Test Guidelines**

1. Longitudinal test(s), as necessary with the SID anthropomorphic test dummy (ATD), or as necessary EuroSID ATD, undeformed floor, no yaw, and with all lateral structural supports (armrests/walls).  
*Pass/fail injury assessments:* TTI pelvic acceleration, neck, leg, and spine injury.
2. One longitudinal test with the Hybrid II ATD, deformed floor, with 10 degrees yaw, and with all lateral structural supports (armrests/walls).  
*Pass/fail injury assessments:* HIC; and upper torso restraint load, restraint system retention, and pelvic acceleration.

3. Vertical (14g) test is to be conducted with modified Hybrid II ATDs with existing pass/fail criteria.

**Note:** Boeing must demonstrate that the installation of seats via plinths or pallets meets all applicable requirements. Compliance with the guidance contained in FAA Policy Memorandum PS-ANM-100-2000-00123, dated February 2, 2000, titled “Guidance for Demonstrating Compliance with Seat Dynamic Testing for Plinths and Pallets,” is acceptable to the FAA.

***Inflatable Lapbelt Conditions***

If inflatable lapbelts are installed on single-place side-facing seats, the inflatable lapbelt(s) must meet special conditions 25-431-SC.

Issued in Renton, Washington, on May 12, 2014.

Jeffrey E. Duven  
Manager, Transport Airplane Directorate  
Aircraft Certification Service

[FR Doc. 2014-13664 Filed 06/11/2014 at 8:45 am; Publication Date: 06/12/2014]